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(71) Applicant *(for all designated States except US)*: **NOKIA CORPORATION** [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **HURTTA, Tuija** [FI/FI]; Kistkottajankuja 4 D 49, FIN-02660 Espoo (FI). **PUUSKARI, Mikko** [FI/FI]; Nokia Networks Oy, Keilalahdentie 4, FIN-02150 Espoo (FI). **HAMITI, Shkumbin** [FI/FI]; Leenankuja, FIN-02230 Espoo (FI). **JÄPPINEN, Teemu** [FI/FI]; Nokia Networks Oy, Keilalahdentie 4, FIN-02150 Espoo (FI). **GREIS, Marc** [FI/FI]; Nokia Networks Oy, Keilalahdentie 4, FIN-02150 Espoo (FI). **HAUMONT, Serge** [FR/FI]; Nokia Networks Oy, Keilalahdentie 4, FIN-02150 Espoo (FI).

(74) Agents: **PELLMANN, Hans-Bernd** et al.; Tiedtke-Bühling-Kinne, Bavariaring 4, D-80336 Munich (DE).

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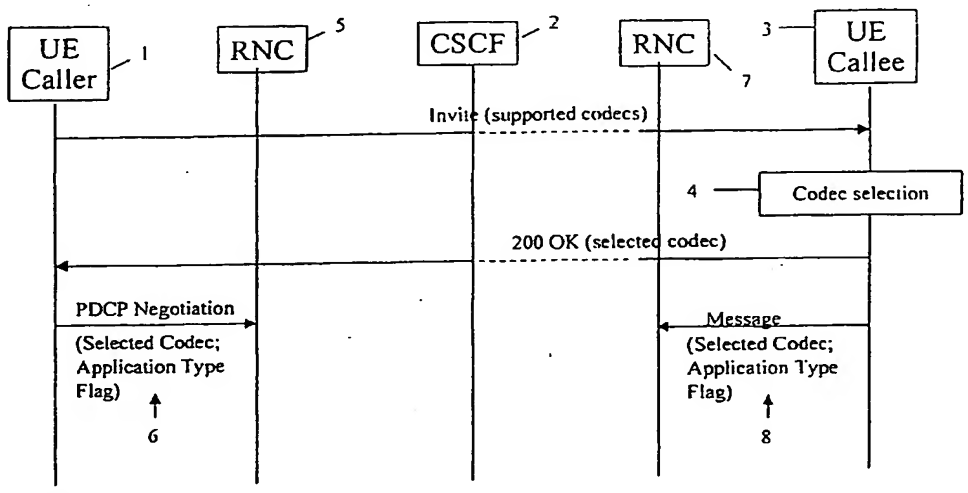

(57) Abstract: The invention relates to a method and a communication system comprising at least one first network element connectable to a second network element. At least one of the first and second network elements are able to use one of two or more selectable modes for communicating with another network element. One or both of the network elements, or a third network element which is connectable with the first and second network elements, is adapted to perform a mode selection procedure for selecting the same mode for bidirectional communication between the network elements. The modes preferably are different codec types or channel-coding schemes, or radio interface protocol types. The first and/or second network elements may be portable terminal equipments whereas the third network element preferably is a support node or a means providing a support function such as a CSCF. The mode selection ensures the use of one and the same mode such as a codec in uplink and downlink direction and thus enables e.g. IP telephony in UMTS using SIP protocol.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Communication System and Method Providing a Mode Selection Procedure

FIELD OF THE INVENTION

The present invention relates to a communication system adapted to perform a mode selection by selecting or negotiating the mode to be used. Furthermore, the invention relates to a method to be performed in such a communication system, and to a network element capable of mode selection.

BACKGROUND OF THE INVENTION

Communication networks transfer information such as user voice traffic or the like, on a packet-switched and/or circuit-switched basis using modes which may be commanded by the system or negotiated between the involved network elements such as end user equipments. As an example, in planned evolution of networks such as UMTS (Universal Mobile Telecommunication System) systems, additional functions and services can be incorporated. For instance, novel multimedia services such as multimedia messaging services MMS are supported within the system which services are IP (Internet Protocol)-based services. Packet-based (e.g. IP-based) service sessions such as multimedia service sessions may be controlled by a specific protocol. As an example, the Session Initiation Protocol (SIP) represents a protocol which may be used e.g. for call and connection establishment as well as for transport of endpoint capability information. Such capability information may e.g. relate to voice and multimedia codecs supported by the end terminals.

The functionality and services of such multimedia service systems will be mapped onto the existing network system

functions, e.g. of UMTS type. As an example, the system services may be mapped to the PDP contexts and radio signalling, as well as to existing packet-switched core network elements and interfaces, e.g. of UMTS type. Hence, there is a problem of multimedia (e.g. IP multimedia) and network layer (e.g. GPRS layer) interactions and mapping.

As an example, in case of VoIP calls (voice over IP-based connection, i.e. Internet telephony), the radio access network such as GERAN ("GSM/Edge Radio Access Network") and UTRAN (UMTS Terrestrial Radio Access Network), may be informed on the type of application for deciding on the header adaptation method to be used for e.g. a particular PDP context. As an example, two different header adaptation schemes available for selection can for example be "header compression" and "header stripping/removal". The header stripping/removal mode may be used for speech-only traffic where e.g. optimised speech transport is required for instance for integrated lower-end terminal devices. A header compression mode may be utilised e.g. for more general IP multimedia traffic including voice application operation on an external device such as a laptop computer connected to a UMTS phone.

When an inappropriate mode such as inappropriate protocol mode, header adaptation mode or radio access bearer mode should be selected, problems in incorrect message transmission may occur.

SUMMARY OF THE INVENTION

The invention provides a method and system as defined in anyone of the claims.

In more detail, a communication system, and/or a method to be performed in a communication system, comprises at least one first network element connectable to a second network element

via one or more packet-based networks. At least one of the first and second network elements provide two or more selectable modes for communicating with another network element. A mode selection procedure is performed (e.g. by one or both of the network elements, or by a third network element connected to the first and second network elements), for selecting the same mode for bidirectional communication between the network elements. The selectable modes preferably are different codec types, or may be conversion modes of other type, or radio interface protocol types or channel-coding schemes etc.

The first and/or second network elements may be portable terminal equipments. The third network element preferably is a support node or support function.

In a preferred embodiment, a protocol mainly used for other purposes but also capable of providing a messaging service, preferably an IP-based multimedia messaging service, is used for sending information on supported or selected modes to and from the network elements. The protocol may be the Session Initiation Protocol (SIP). SIP is a multimedia session establishment & control protocol, i.e. a control protocol for realtime multimedia.

Preferably, the network or networks connecting the first and second network elements is/are UMTS-based network.

In one embodiment, the first network element may send information on one or more modes supported by the first network element to the third network element which performs the selection procedure and sends information on only one or more than one but not all supported modes to the second network element which sends an acknowledgment message to the third network element confirming the support of the selected, or one

of the selected modes, the third network element sending a message to the first network element informing the latter on the selected mode. This is one difference between a preferred embodiment of the invention and the usual SIP operation. Usually there is no negotiation between the used codecs etc. but both elements include information on their own capabilities in the SIP messages. Here, a selection and a specific usage of the information fields etc. is proposed.

In another embodiment, the first network element may send information on one or more modes supported by the first network element to the third network element which requests the second network element to send information on the supported modes, the second network element returning a list of supported modes to the third network element whereupon the third network element performs the selection procedure and sends messages to the first and second network elements informing these network elements on the selected mode.

In a further embodiment, the first network element performs the selection procedure when initiating a connection to the second network element, and sends information on one mode supported by the first network element to the second network element. The second network element, when supporting the mode, returns an acknowledgment message, or, when not supporting the mode, returns a message indicating another mode supported by the second network element, to the first network element. The first network element selects this mode for further communication when supporting it, or, when the first network element does not support the mode indicated by the second network element repeats the steps a) to d) selecting another mode.

In a further embodiment, the first network element, when initiating a connection to the second network element, sends information on all modes supported by the first network element

to the second network element. The second network element performs the selection procedure and returns a message indicating the selected mode to the first network element, the first and second network elements selecting the indicated mode for further communication.

The first network element and/or second network element and/or third network element preferably send information on the selected mode to a radio network control means. The information on the selected protocol mode may e.g. be sent as part of a negotiation procedure related to packet data convergence protocol, or in an Activate PDP Context message. The information on the selected mode preferably contains an additional flag indicating the application type. It is possible to send only the application type and no other information.

The information on the selected mode preferably contains additional information on the header processing such as header compression or header stripping/removal.

Generally, in accordance with the present invention, a selection procedure is provided for performing a mode selection, preferably when establishing a connection between two network elements. This mode selection such as protocol selection is ensuring that the bi-directional communication between the network elements is performed in a defined manner such as use of the same mode in uplink and downlink direction.

As an example, such a mode selection is able to ensure that e.g. the radio access bearers in an UMTS network use and support the same codec type (e.g. AMR (Adaptive Multi-Rate), GSM FR (Full Rate), GSM EFR (Enhanced Full Rate), etc.) at the same time, and use the same, i.e. only one, codec type in uplink and downlink directions. In some cases such as AMR, there might otherwise be provided different codec modes in

uplink and downlink direction. The codec information may be used to select the appropriate radio interface protocol modes including an appropriate channel coding scheme for voice traffic.

The use of the same codec in both directions guarantees that the channel coding for the corresponding radio bearer of a PDP (Packet Data Protocol) context is appropriately and correctly selected so as to be the same in both directions. As at least one PDP context is necessary for carrying the voice traffic, an appropriate radio bearer is selected so that UMTS IP telephony can be performed (VoIP) without problems.

An advantage of the invention is the possibility to enable e.g. SIP operation on top of an UMTS radio access network architecture and bearers. Apart from the fact that the new information on selected mode and application type provided to the radio access network is already a sort of change of the existing network architecture, no other changes of existing radio access networks such as UTRAN or GERAN for any actual or future definition such as 3GPP Release 2000 are necessary for solving the above mentioned problems. The invention therefore provides a solution for IP telephony on UMTS.

The solution according to the invention can be implemented as a proprietary mechanism or function, or can be a standardised mechanism or function.

In accordance with a further aspect of the invention, a network element is provided, preferably to be used in a method or communication system as described above, the network element being adapted to perform a selection procedure for selecting one of several modes supported by this or another network element. The modes may be different conversion modes, in particular coding/decoding modes.

Further aspects, advantages and details of the invention will be described by referring to the attached drawings which disclose preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE INVENTION

Fig. 1 shows the basic structure of a first embodiment of the present invention;

Fig. 2 illustrates a second embodiment of the invention;

Fig. 3 shows another embodiment of the invention; and

Fig. 4 illustrates a further embodiment of the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

Before describing some embodiments of the invention in more detail, several general aspects and features of the invention will be discussed. In connection set-up, some protocols such as the call establishment procedures of SIP (Session Initiation Protocol) allow negotiation and usage of several codecs from end-to-end, that is between the call originating element and the call terminating element. Further, such protocols may also allow the use of different codecs in uplink and downlink directions. Due to the selection procedure performed in accordance with a preferred aspect of the invention, IP telephony applications in networks such as UMTS of third generation type can be used on top of the UMTS radio access networks (RANs) without interfering with the functionality of the system and with minimum changes of the system. Hence, correct functioning can be ensured also in such cases.

When using for instance SIP, the caller may send a set of supported codecs to the callee or to a third network element. The callee may also send a set of supported codecs to the caller or to the third network element. After the call-setup, when sending VoIP packets, the invention may be used to guarantee that the caller uses one of the codecs supported by the callee and the callee uses one of the codecs supported by the caller, and that these used codecs are the same for the callee and the caller. Otherwise, when not performing a mode selection procedure for selecting e.g. only one and the same codec for the bidirectional communication, the sender might dynamically select a codec from the set of codecs supported by the recipient when sending data to the latter so that different codecs might eventually be used. Furthermore, the used codec might be different in different directions.

In accordance with preferred implementations of the invention, several alternatives are disclosed. According to one aspect, a terminal equipment (network element), e.g. a UMTS phone, or the network, e.g. the UMTS network, functions so as to ensure that always only one codec type is used in each direction, and further that this codec type is the same in both directions. This may be achieved in one or both terminal equipments such as UMTS terminals by mandating support for specific codec(s) in all cases and/or by defining that only one codec can be announced to the other endpoint as supported codec.

Furthermore, the behaviour of the callee is defined and adapted in such a manner that the call terminating equipment selects, if possible, the same codec as the one announced by the call originating equipment. In case of failure of the call terminating equipment in selecting the same codec as the one announced by the call originating equipment, the call terminating equipment is preferably adapted to select a codec which is mandatory in systems of the third generation (3G systems), and to announce this codec to the call originating

equipment. The call originating equipment will support the announced codec as it is a mandatory one, and is adapted to assume at this point that the call terminating equipment will use the same codec also in sending data, and will therefore adjust its behaviour accordingly.

In accordance with another alternative embodiment of the invention, a further solution is provided. In the network such as the UMTS network, a control means (third network element) will decide on the codec to be used and will handle the selection procedure and the necessary messages to be sent to the call originating and terminating equipments. This control means may e.g. be the CSCF (Call State Control Function) of the network and/or may e.g. be the proxy CSCF in the visited network such as PLMN (Public Land Mobile Network) in case of a roaming subscriber, and/or the home CSCF in the home network e.g. PLMN of the subscriber.

The control means can render the decision on the codec to be used by both the call originating and terminating equipments. In preferred implementation, the codecs supported by the call originating equipment are included in a specific message such as the Invite message of SIP. After receiving the Invite message, the control means such as CSCF can select one of the codecs, i.e. perform the mode selection procedure, and can modify the Invite message so as to include only the selected codec before forwarding the Invite message to the call terminating equipment. The call terminating equipment is adapted to acknowledge receipt the Invite message by sending an acknowledgement message such as 200 OK message of SIP, only if it supports the single codec indicated in the Invite message as selected by the control means. It is possible to send an acknowledgement message also in the negative case, e.g., giving negative acknowledge or including the supported codecs by the call terminating equipment.)

The selection procedure performed in the control means such as CSCF may be based e.g. on the operator preferences. As an example, when the operator prefers to use AMR, the selection procedure is adapted to select AMR from a set including FR, HR and AMR. Another example is a case when a transcoder pool is used. In such a case, the operator may optimise the usage of the transcoders. In the latter case, the decision and selection is preferably made in a control means of the visited network, that is in a visited network element such as e.g. in the proxy CSCF.

Furthermore, location information of the user may be taken into account when deciding on the codec to be used. For example, if the base station subsystems (BSSs) in different parts of the network/country are e.g. based on different product releases and for this or other reasons prefer different codecs, or for reasons of transcoder pool optimisation, the codec selection procedure may be adapted to take account of such parameters.

A further alternative approach implemented in another embodiment of the invention is the selection of the codec by a control network element such as CSCF after having received information on all codecs supported by the call originating equipment (e.g. in an Invite message) and on all codecs supported by the call terminating equipment (e.g. in the 200 OK message of SIP). After having received both the messages, the control means knows both codec sets supported by the call originating equipment as well as by the call terminating equipment. The control means then performs the mode selection step by selecting one codec supported by both call originating and terminating equipments either by arbitrarily or by reference to a priority list ranking the codecs according to the priority assigned by e.g. the network operator or service provider.

After selecting the codec to be used by both call originating and terminating equipments, the selected codec is sent to the call originating equipment in a further message such as a 200 OK message of SIP generated by modifying the 200 OK message received from the call terminating equipment, and to the call terminating equipment in another message such as a ACK message of SIP.

When the codec to be used has been selected, one or more network elements, in particular control elements such as the radio network controllers or base station subsystems controlling the radio access to the call originating and/or call terminating equipment have to be informed on the selected codec. This informing of the network control elements can be performed in several alternative ways which are listed below in the preferred order.

1.) The call originating and/or terminating equipment such as a mobile station (MS) sends information on the selected codec to the radio access controller (e.g. RNC, Radio Network Controller) as part of the PDCP (Packet Data Convergence Protocol) negotiation. The messages sent to the control element informing the same about the selected codec may additionally include a separate flag or other indication to indicate the application type, and/or whether to use header compression or header stripping/removal for this particular PDP context.

2.) As an alternative, the call originating and/or terminating equipment sends the information on the selected codec to the serving node such as SGSN (Serving GPRS Support Node). The serving node forwards the information on the selected codec to the control element such as RNC in the RAB (Radio Access Bearer) establishment request message. The transmitted message(s) may additionally include further information such as a flag to indicate the application type,

and/or whether to use header compression or stripping/removal for a particular PDP context.

3.) The call state controlling means such as CSCF may send information on the selected codec to the radio access control means such as RNC (e.g. in the following manner: CSCF -> GGSN (Gateway GPRS Support Node), GGSN -> SGSN, SGSN -> RNC). As already stated above, the messages may also include a separate indication such as a flag to indicate the application type, and/or whether to use header compression or stripping/removal for the particular PDP context.

When an application type indication (e.g. application type flag) is included, the information on the application type is transmitted from the call originating or terminating equipment (e.g. Mobile Station MS) or from the call control means (e.g. CSCF) because these entities are, in an UMTS network, the only entities having enough information about the services and applications running on top of the PDP contexts. The header compression is preferably set as the default operation if the application type is not known or indicated in the message. The header stripping/removal is preferably used for optimised speech transmission when only voice traffic is carried in the PDP context.

The necessary application information is preferably received through internal application programming interfaces (APIs) of the call originating and/or terminating equipments (the internal APIs being arranged between the applications/services), the SIP layer and the UMTS/GPRS layers. Header stripping/removal is preferably used only in the case of an integrated UMTS SIP terminal. It may also be provided from a laptop computer to a UMTS phone in a case where the terminal equipment (TE) and the call originating and/or terminating equipments are separate devices. The application type indication such as a flag may for example have the following

explicit values: "header compression", or "header stripping/removal", or "application type" (e.g. value: voice) which indicates that stripping/removal is to be used.

In the following, details of a first embodiment will be described with reference tio Fig. 1. Fig. 1 shows a terminal network element 1 which is termed "UE (User Equipment) Caller" and requests the establishment of a connection to another network element 3. The network element 3 thus represents a call terminating equipment and is termed "UE Callee". The network comprises a further network element 2 which is a connection control element and is implemented as, or provides, a call state control function (CSCF). When the network element 1 such as a MS (Mobile Station) desires to establish a connection to the terminal network element 3, it is adapted to send, in this embodiment, a message to the CSCF 2 informing the latter on the desire to establish a connection to the terminal equipment element 3 which message contains information on all codecs supported by the network element 1, i.e. the call originating equipment. This message may be an Invite message of the connection protocol, preferably SIP. This Invite message contains a list of codecs supported by network element 1.

The CSCF element 2 is adapted to perform a mode selection procedure which, in this embodiment, is a codec selection procedure 4 selecting one of the codecs supported by equipment 1. This codec selection 4 may be based on preference or priority parameters contained in CSCF 2, or may be dependent from the type of application desired by equipment 1 such as pure data transmission, pure voice over IP transmission, and the like.

After performing the codec selection procedure 4, the CSCF 2 further transmits the Invite message to the user equipment 3, the message now only including the codec selected by the codec selection procedure 4. The user equipment 3 which may likewise

be a mobile station or a stationary equipment, performs an internal check whether it supports the codec indicated in the received Invite message. If yes, the user equipment 3 returns an acknowledgement message to the CSCF 2 (preferably a 200 OK message in SIP) which message repeats the selected codec for confirmation of its support by user equipment 3. The CSCF 2 transmits this acknowledgement message to the user equipment 1 (200 OK (selected codec)) in SIP.

When receiving this message, the user equipment 1 is adapted to use only this indicated codec for uplink and downlink links. In a similar manner, user equipment 3 is adapted to use only the selected codec for uplink and downlink traffic, i.e. for radio access between user equipment 3 and the radio access controlling means such as RCP (Radio Network Controller). The radio network controllers handling the radio access to the user equipments 1 and 3 will likewise be informed on the selected codec using one of the above-mentioned methods as an example, and will adapt their operation mode accordingly.

When the user equipment 3 should not support the selected codec indicated in the Invite message received from CSCF 2, it is preferably adapted to send a message to CSCF 2 informing the latter on lack of support of the selected codec. Thereupon, the CSCF 2 repeats the codec selection procedure 4 but now selecting another codec different from the first selected codec, and sends this newly selected codec in a message such as an Invite message to user equipment 3. When this codec is supported by user equipment 3, it returns the 200 OK message, otherwise the above steps are repeated until a codec is selected which is supported by the user equipment 3.

Fig. 2 shows another embodiment of the invention wherein the codec selection procedure 4 is performed, similar as in the first embodiment, by CSCF 2. Contrary to the above discussed first embodiment, the CSCF 2 requests, after receipt of an

Invite message indicating all or at least some of the codecs supported by the user equipment 1, the user equipment 3 to return information on all codecs supported by user equipment 3. This message may be an Invite message of SIP defining a request for returning a list of supported codecs. The user equipment 3 returns a message (e.g. 200 OK message of SIP) which contains a list of codecs supported by user equipment 3.

This list may contain all codecs supported by user equipment 3, or may indicate only those codecs which are also supported by the user equipment 1. In the latter case, the user equipment 3 receives, in the Invite message from CSCF 2, a list of the codecs supported by the user equipment 1, and is adapted to perform a comparison of codecs supported by user equipment 1 and codecs supported by user equipment 3, selecting only those codecs which are supported by both user equipments 1 and 3. In the former case in which the list returned by the user equipment 3 includes all supported codecs, the Invite message sent from CSCF 2 to the user equipment 3 may not contain any indication of codecs supported by user equipment 1.

The CSCF 2 selects, by the codec selection procedure 4, one of the codecs supported by both user equipments 1 and 3, and then sends messages to both user equipments 1 and 3 informing them on the selected codec for use thereof during the subsequent connection. The message addressed to user equipment 1 may be a message 200 OK of SIP indicating the selected codec. The user equipment 1 may return an acknowledgement message to the CSCF 2 acknowledging the receipt of the 200 OK message and eventually repeating the selected codec. The CSCF 2 may forward the acknowledgement message received from user equipment 1 to user equipment 3 after adding (if not already included) an information indicating the selected codec.

The embodiment of Fig. 2 contributes to a very quick selection of a codec supported by both user equipments.

All explanations, features and advantages stated above with regard to the first embodiment are also applicable with regard to this second embodiment (unless being in contradiction to the above explanations), and also for the subsequently discussed embodiments 3 and 4.

The embodiment shown in Fig. 3 is different from the above discussed first and second embodiment in that the codec selection procedure 4 is performed by and in the user equipment 1. After having performed the codec selection depending on the intended application (voice transmission, non-real-time traffic or the like, or depending on other parameters, the user equipment 1 sends a message such as an Invite message to the user equipment 3 via the CSCF 2, indicating the selected codec. The user equipment 3, when supporting the selected codec, returns, via CSCF 2, an acknowledgement message which may be a 200 OK message indicating the selected supported codec.

In case user equipment 3 does not support the selected codec, the repetition of the codec selection procedure 4 including the transmission of the related messaging, is repeated, as already stated above with regard to the first embodiment (with the exception that the code selection procedure 4 is repeated in the user equipment 1 and not in the CSCF 2. All other explanations given above with regard to the first and second embodiments likewise apply to this third embodiment.

Fig. 4 illustrates a fourth embodiment wherein the codec selection procedure 4 is performed in the user equipment 3. In this case, the user equipment 1 sends a message, via CSCF 2, to the user equipment 3 indicating all codecs supported by user equipment 1. This message may be an Invite message of SIP. After having received information on the codecs supported by user equipment 1, the user equipment 3 performs the codec selection procedure 4 by selecting, from the list of codecs

supported by user equipment 1, one of the codecs which is also supported by user equipment 3. After having performed the codec selection procedure 4, the user equipment 3 sends a message to the user equipment 1, via the CSCF 2, informing user equipment 1 and eventually also CSCF 2, on the selected codec. The selected codec is thereafter used by both user equipments 1 and 3. All other explanations given above with regard to the first to third embodiment likewise apply to the present fourth embodiment.

As shown in Fig. 4 (the procedure shown in Fig. 4 is preferably common to all the earlier embodiments of the invention), a radio access controller such as RNC 5 being in charge of radio access control to user equipment 1 is informed by user equipment 1 on the selected codec, and preferably also on the application type by sending an application type flag indicating e.g. "header compression" or "header stripping/removal". This information can be sent when performing the PDCP negotiation 6 but may also be sent in a separate message. In a similar manner, the user equipment 3 informs its radio access control element such as RNC 7 being in charge of radio access control to user equipment 3 by sending a message 8 to RNC 7. This message indicates the selected codec and may also contain, if known, an application type flag.

This informing of the radio access control elements 5 and 7 in charge of the radio access to and from the user equipments 1 and 3, respectively, is likewise applicable to all above described first to third embodiments in identical manner.

Although preferred embodiments have been described above, the present invention is not limited thereto and intends to cover also all modifications, amendments, additions and deletions of features within the abilities of a skilled man. As an example, the mode selection procedure has been described with reference to the codec selection but may also consist in a conversion

modes selection of other type, a protocol selection procedure or the like.

CLAIMS

1. Method to be performed in a communication system comprising at least one first network element connectable to a second network element via one or more packet-based networks, at least one of the first and second network elements providing two or more selectable modes for communicating towards another network element,

wherein a mode selection procedure is performed , the mode selection procedure selecting the same mode for bidirectional communication between the network elements, and the mode selected is used in both directions in the bidirectional communication between the first and the second network elements.

2. A method according to claim 1, wherein the mode selection procedure is performed by a network element, and the network element performing the mode selection procedure is one of the following: the first network element, the second network element, or a third network element connected to the first and second network elements.

3. Method according to claim 1 or 2, wherein the selectable modes are different codec types.

4. Method according to claim 1, 2, or 3, wherein the selectable modes are radio interface protocol types.

5. Method according to any one of the preceding claims, wherein the modes are channel-coding schemes.

6. Method according to any one of the preceding claims, wherein the first and/or second network elements are portable terminal equipments.

7. Method according to any one of the preceding claims, wherein the third network element is a support node or support function.

8. Method according to any one of the preceding claims, wherein a call control is used for sending information on supported or selected modes to and from the network elements.

9. Method according to claim 8, wherein the protocol providing the call control is the Session Initiation Protocol (SIP).

10. Method according to any one of the preceding claims, wherein the network or networks connecting the first and second network elements is/are a UMTS-based network.

11. Method according to any one of the preceding claims, wherein the first network element is sending information on one or more modes supported by the first network element to the third network element which performs the selection procedure and sends information on only one or more than one but not all supported modes to the second network element which sends an acknowledgment message to the third network element confirming the support of the selected, or one of the selected modes, the third network element sending a message to the first network element informing the latter on the selected mode.

12. Method according to any one of claims 1 to 10, wherein the first network element is sending information on one or more modes supported by the first network element to the third network element which requests the second network element to

send information on the supported modes, the second network element returning a list of supported modes to the third network element whereupon the third network element performs the selection procedure and sends messages to the first and second network elements informing these network elements on the selected mode.

13. Method according to any one of claims 1 to 10, wherein
a) the first network element performs the selection procedure when initiating a connection to the second network element, and sends information on one mode supported by the first network element to the second network element,
b) the second network element, when supporting the mode, returns an acknowledgment message, or, when not supporting the mode, returns a message indicating another mode supported by the second network element, to the first network element, and
c) the first network element selects this mode for further communication when supporting it, or
d) when the first network element does not support the mode indicated by the second network element otherwise repeating the steps a) to d) selecting another mode.

14. Method according to any one of claims 1 to 10, wherein the first network element, when initiating a connection to the second network element, sends information on all modes supported by the first network element to the second network element,
the second network element performs the selection procedure and returns a message indicating the selected mode to the first network element,
the first and second network elements selecting the indicated mode for further communication.

15. Method according to any one of the preceding claims, wherein the first network element and/or second network element

and/or third network element is sending information on the selected mode to a radio network control means.

16. Method according to claim 15, wherein the information on the selected protocol mode is sent as part of a negotiation procedure related to packet data convergence protocol, or in an Activate PDP Context message.

17. Method according to claim 15 or 16, wherein the information on the selected mode contains an additional flag indicating the application type.

18. Method according to claim 15, 16, or 17, wherein the information on the selected protocol mode contains additional information on the header processing such as header compression or header stripping/removal.

19. Communication system comprising at least one first network element connectable to a second network element, at least one of the first and second network elements providing two or more selectable modes for communicating towards another network element,

wherein the system is adapted to perform a mode selection procedure, the mode selection procedure selecting the same mode for bidirectional communication between the network elements, and the mode selected is to be used in both directions in the bidirectional communication between the first and the second network elements.

20. System according to claim 19, wherein a network element is adapted to perform the mode selection procedure, the network element performing the mode selection procedure is one of the following: the first network element, the second network element, or a third network element connected to the first and second network elements.

21. System according to claim 19 or 20, wherein the modes are different codec types or channel-coding schemes, or radio interface protocol types.

22. System according to claim 19, 20 or 21, wherein the first and/or second network elements are portable terminal equipments.

23. System according to any one of claims 19 to 22, wherein the third network element is a support node or a means providing a support function.

24. System according to any one of claims 19 to 23, wherein a network or networks connecting the first and second network elements is/are a packet-based network, preferably UMTS-based network.

25. System according to any one of claims 19 to 24, wherein the first network element is adapted to send information on one or more protocol modes supported by the first network element to the third network element which is adapted to perform the selection procedure and to send information on only one or more than one but not all supported protocol modes to the second network element, the latter being adapted to send an acknowledgment message to the third network element confirming the support of the selected, or one of the selected protocol modes, the third network element being adapted to send a message to the first network element informing the latter on the selected protocol mode.

26. System according to any one of claims 19 to 24, wherein the first network element is adapted to send information on one or more protocol modes supported by the first network element to the third network element which is

adapted to request the second network element to send information on the supported protocol modes, the second network element being adapted to return a list of supported protocol modes to the third network element whereupon the third network element is adapted to perform the selection procedure and to send messages to the first and second network elements informing these network elements on the selected protocol mode.

27. System according to any one of claims 19 to 24, wherein

a) the first network element is adapted to perform the selection procedure when initiating a connection to the second network element, and to send information on one mode supported by the first network element to the second network element,

b) the second network element being adapted to return, when supporting the mode, an acknowledgment message, or, when not supporting the mode, to return a message indicating another mode supported by the second network element, to the first network element, and

c) the first network element being adapted to select this mode for further communication when supporting it, or,

d) when the first network element does not support the mode indicated by the second network element, the system being adapted to repeat the steps a) to d) selecting another mode.

28. System according to any one of claims 19 to 24, wherein

a) the first network element is adapted to send, when initiating a connection to the second network element, information on all modes supported by the first network element to the second network element,

b) the second network element being adapted to perform the selection procedure and to return a message indicating the selected mode to the first network element,

the first and second network elements being adapted to use the

indicated mode for further communication.

29. System according to any one of claims 19 to 28, wherein the system is adapted to use a call control protocol for sending information on supported or selected modes to and from the network elements.

30. System according to claim 29, wherein the protocol is the Session Initiating Protocol (SIP).

31. System according to any one of claims 19 to 30, wherein the first network element and/or second network element and/or third network element is adapted to send information on the selected mode to a radio network control means.

32. System according to claim 31, being adapted to send the information on the selected mode as part of a negotiation procedure related to packet data convergence protocol, or in an Activate PDP Context message.

33. System according to claim 31 or 32, wherein the information on the selected mode contains an additional flag indicating the application type.

34. System according to claim 31, 32, or 33, wherein the information on the selected mode contains additional information on the header processing such as header compression or header stripping/removal.

35. Network element, preferably to be used in a method as defined in any one of the claims 1 to 18, or in a communication system as defined in any one of claims 19 to 34, the network element being adapted to perform a selection procedure for selecting one of several modes supported by this or another network element.

36. Network element according to claim 35, wherein the modes are different conversion modes, in particular coding/decoding modes.

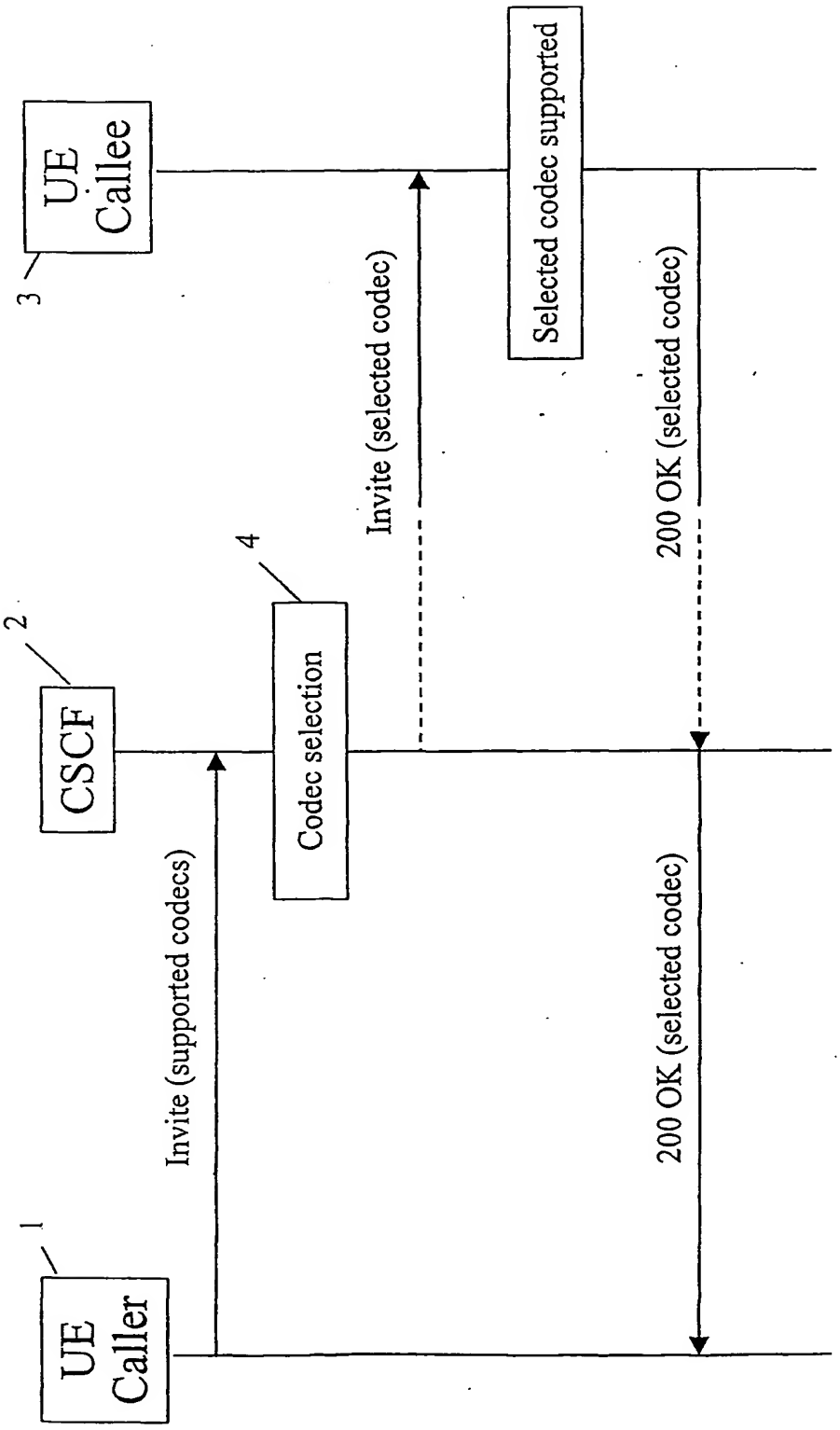
UE Caller
1
CSCF
2
Codec selection
4
UE Callee
3
Invite (supported codecs)
Invite (selected codec)
Selected codec supported
200 OK (selected codec)
200 OK (selected codec)

Fig. 1

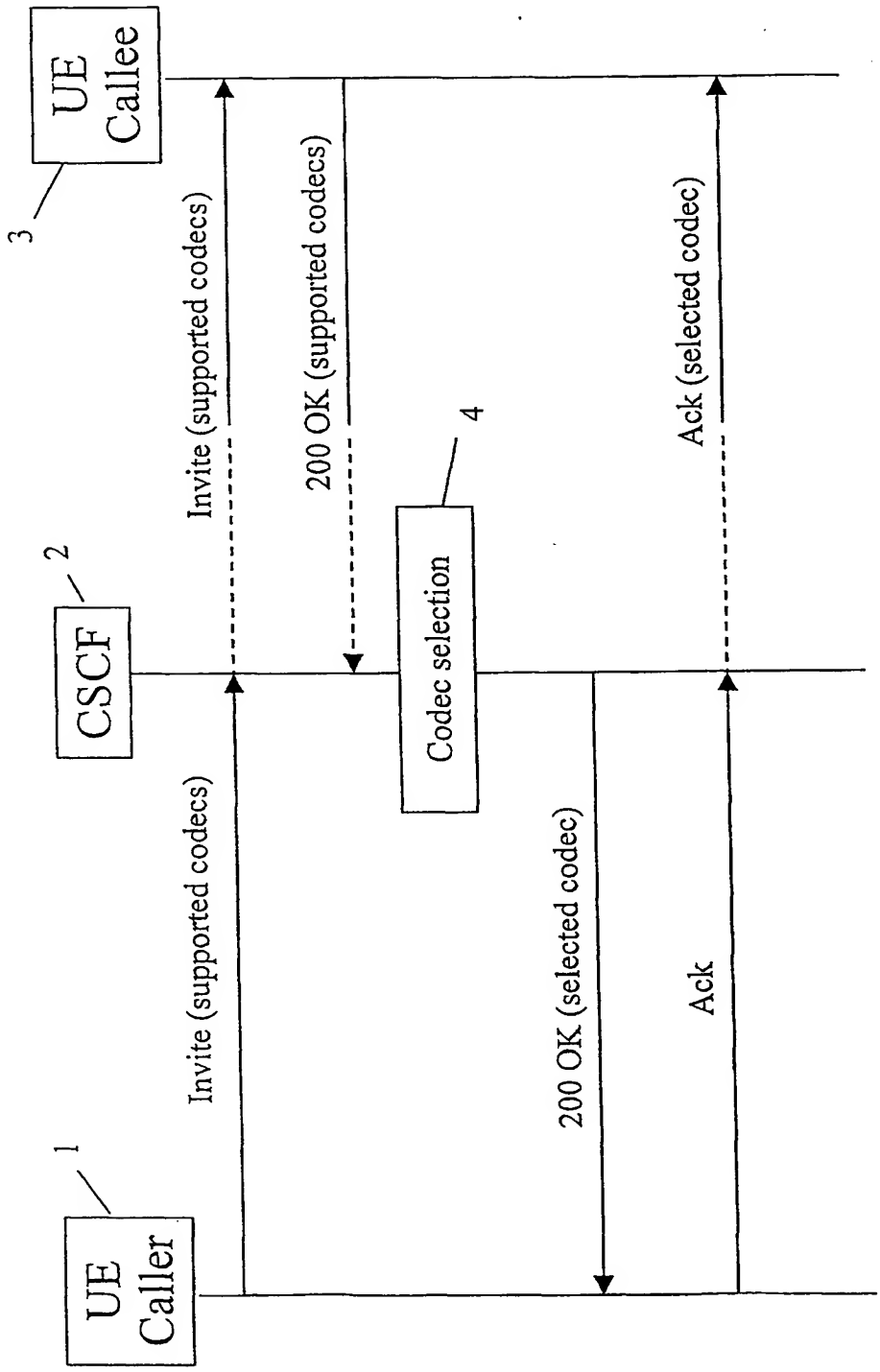
UE Callee
3
CSCF
2
Codec selection
4
UE Caller
1
Invite (supported codecs)
200 OK (supported codecs)
Ack (selected codec)
Invite (supported codecs)
200 OK (selected codec)
Ack

Fig. 2

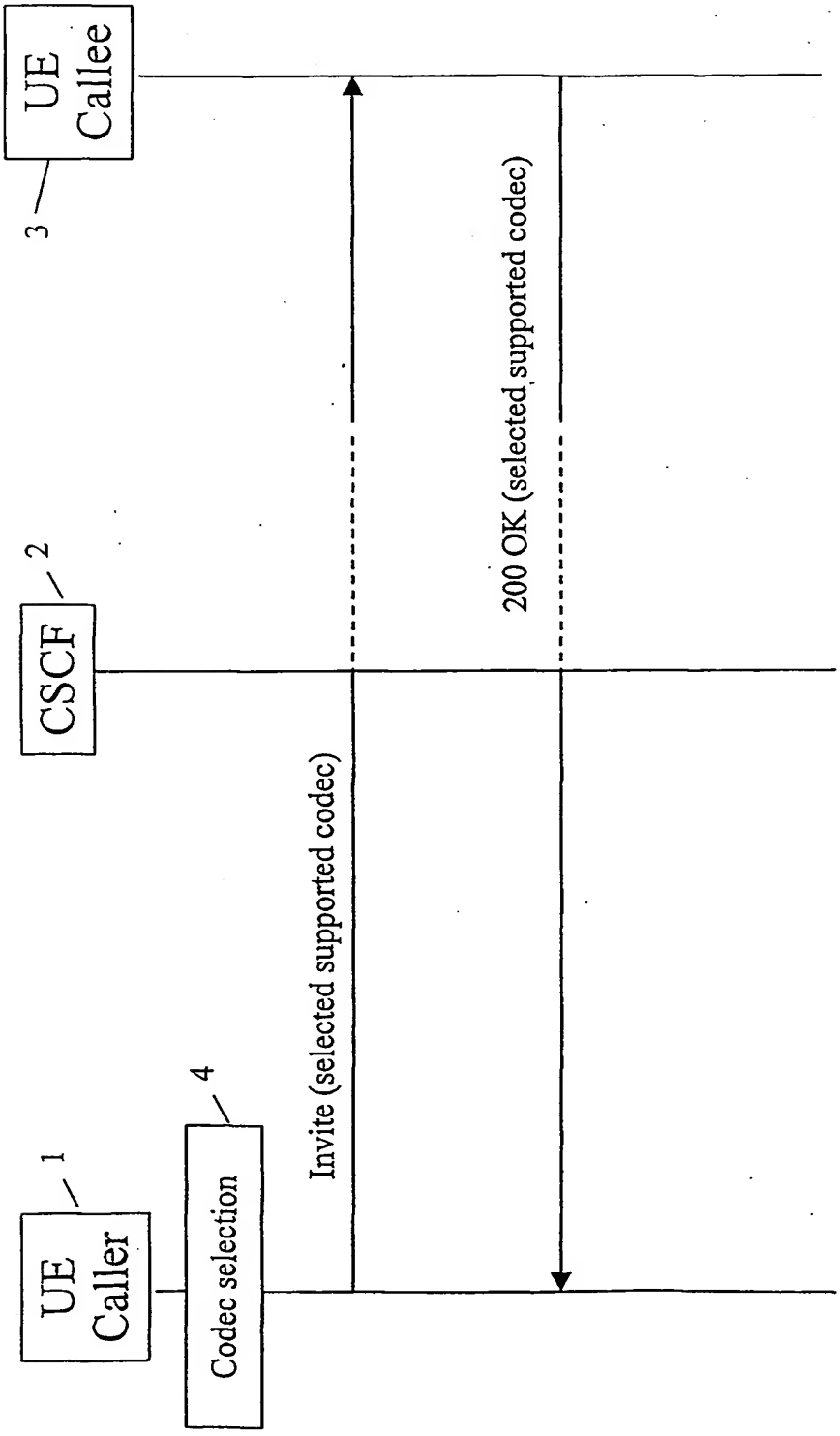
UE Callee
3
CSCF
2
200 OK (selected supported codec)
Invite (selected supported codec)
UE Caller
1
Codec selection
4

Fig. 3

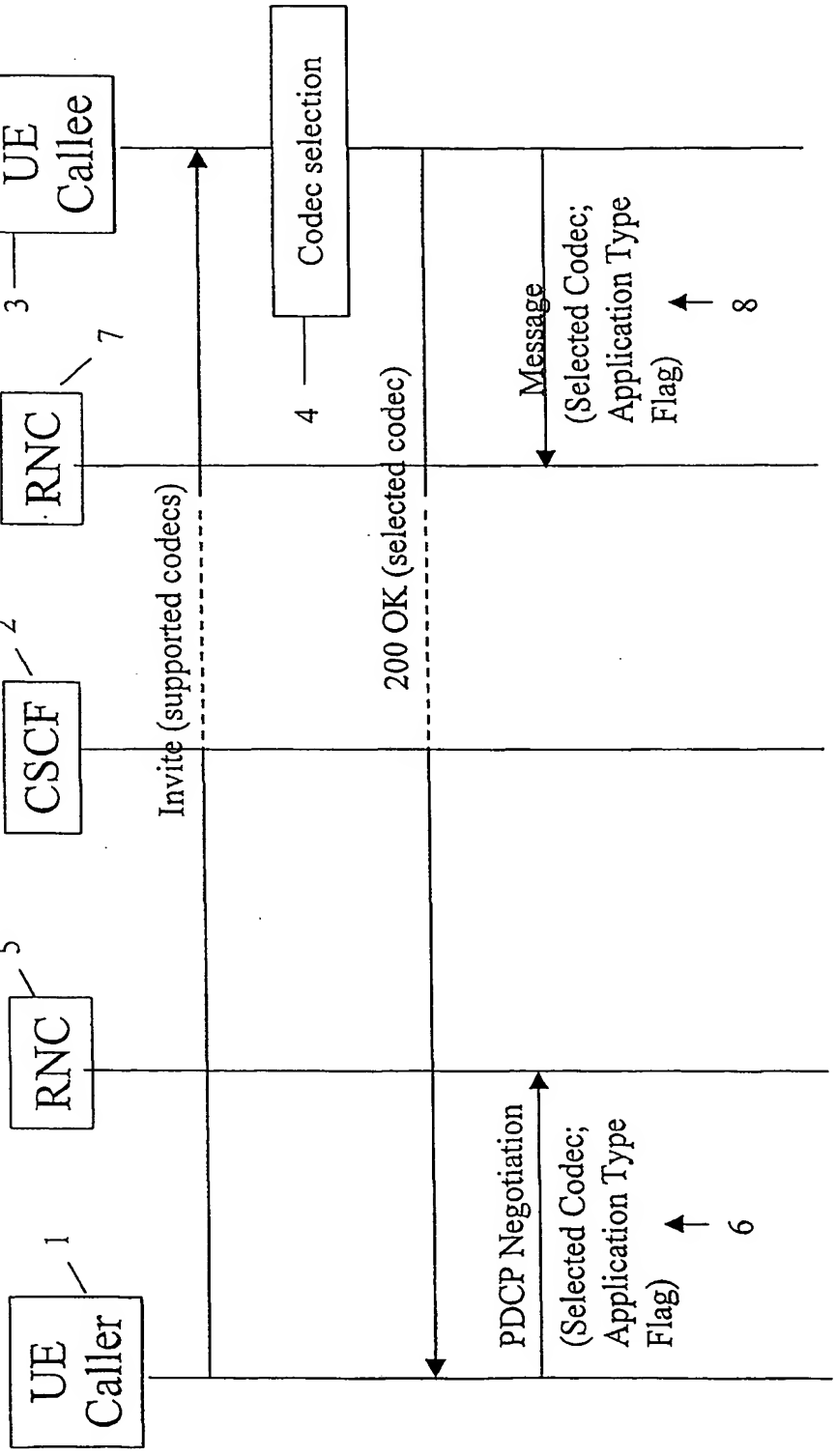
UE Caller
1
RNC
5
CSCF
2
RNC
7
UE Callee
3
Invite (supported codecs)
Codec selection
4
200 OK (selected codec)
Message
(Selected Codec; Application Type Flag)
8
PDCP Negotiation
(Selected Codec; Application Type Flag)
6

Fig. 4

INTERNATIONAL SEARCH REPORT

Interna Application No
PCT/EP 00/07932

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q7/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04Q H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 924 026 A (KRISHNAN ARJUN) 13 July 1999 (1999-07-13) column 3, line 44 -column 4, line 34 column 5, line 30 -column 8, line 64 column 13, line 49 - line 58 column 14, line 28 -column 15, line 15 figures 2,4A,4B	1,2,4, 6-8,13, 14, 19-23, 27-29, 35,36
X	WO 97 48212 A (NOKIA TELECOMMUNICATIONS OY ;KARI HANNU H (FI)) 18 December 1997 (1997-12-18) page 2, line 28 -page 3, line 19 page 4, line 22 -page 5, line 4 figure 1	1-3, 19-21, 35,36

-/—

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 June 2001	18/06/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Barel, C

INTERNATIONAL SEARCH REPORT

Internal Application No
PCT/EP 00/07932

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	PLASSE DELPHINE: "Call Control Scenarios in the all-IP UMTS Core Network" IEEE INTERNATIONAL SYMPOSIUM ON PERSONAL, INDOOR AND MOBILE RADIO COMMUNICATIONS, 18 September 2001 (2001-09-18), XP002165603 * page 322, right-hand column, last paragraph * * page 324, left-hand column, paragraph 5 - right-hand column, paragraph 3 *	1,9,19, 30
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Internal Application No
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